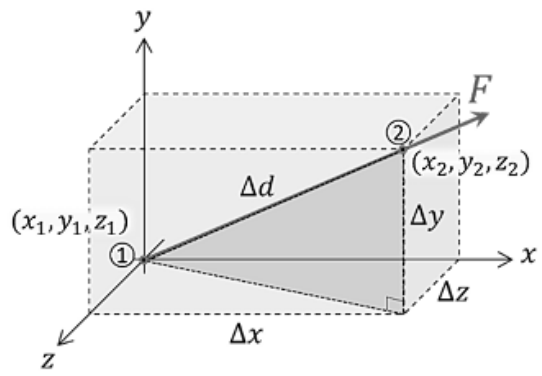
## FORCES IN 3D SPACE




$$F_x = F\left(\frac{\Delta x}{\Delta d}\right) \qquad F_y = F\left(\frac{\Delta y}{\Delta d}\right) \qquad F_z = F\left(\frac{\Delta z}{\Delta d}\right)$$

where: $\Delta d = \sqrt{(\Delta x)^2 + (\Delta y)^2 + (\Delta z)^2}$

Resultant: $F = \sqrt{(F_x)^2 + (F_y)^2 + (F_z)^2}$

Vector Notation of a Force:

$$\vec{F} = F\,\lambda$$

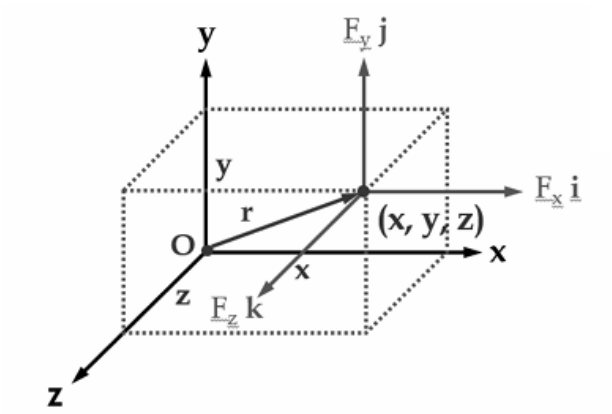
$$\vec{F} = F\left(\cos\theta_x i + \cos\theta_y j + \cos\theta_z k\right)$$

$$\vec{F} = \frac{F}{\Delta d}\left[(\Delta x)i + (\Delta y)j + (\Delta z)k\right]$$

$$\vec{F} = F_x i + F_y j + F_z k$$

where: $\lambda$ is a unit vector alone the line of action of F

## MOMENT OF A FORCE IN 3D SPACE




$$\vec{M} = \vec{r} \times \vec{F}$$

$$\vec{r} = xi + yj + zk \qquad \vec{F} = F_x i + F_y j + F_z k$$

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